

§ 25.146 Licensing and operating authorization provisions for the non-geostationary satellite orbit fixed-satellite service (NGSO FSS) in the bands 10.7 GHz to 14.5 GHz.

(a) A comprehensive technical showing shall be submitted for the proposed non-geostationary satellite orbit fixed-satellite service (NGSO FSS) system in the bands 10.7 GHz to 14.5 GHz. The technical information shall demonstrate that the proposed NGSO FSS system would not exceed the validation equivalent power flux-density (EPFD) limits as specified in § 25.208 (g), (k), and (l) for EPFD_{down}, and EPFD_{up}. If the technical demonstration exceeds the validation EPFD limits at any test points within the U.S. for domestic service and at any points outside of the U.S. for international service or at any points in the geostationary satellite orbit, as appropriate, the application would be unacceptable for filing and will be returned to the applicant with a brief statement identifying the non-compliance technical demonstration. The technical showing consists of the following:

(1) *Single-entry validation equivalent power flux-density, in the space-to-Earth direction, (EPFD_{down}) limits.* (i) Provide a set of power flux-density (pfd) masks, on the surface of the Earth, for each space station in the NGSO FSS system. The pfd masks shall be generated in accordance with the specification stipulated in the ITU-R Recommendation BO.1503, "Functional Description to be used in Developing Software Tools for Determining Conformity of Non-GSO FSS Networks with Limits Contained in Article S22 of the Radio Regulations." In particular, the pfd mask must encompass the power flux-density radiated by the space station regardless of the satellite transmitter power resource allocation and traffic/beam switching strategy that are used at different periods of a NGSO FSS system life. The pfd masks shall also be in an electronic form that can be accessed by the computer program contained in paragraph (a)(1)(iii) of this section.

(ii) Identify and describe in detail the assumptions and conditions used in generating the power flux-density masks.

(iii) If a computer program that has been approved by the ITU for determining compliance with the single-entry EPFD_{down} validation limits is not yet available, the applicant shall provide a computer program for the single-entry EPFD_{down} validation computation, including both the source code and the executable file. This computer program shall be developed in accordance with the specification stipulated in Recommendation ITU-R S.1503 (2000). If the applicant uses the ITU approved software, the applicant shall indicate the program name and the version used.

(iv) Identify and describe in detail the necessary input parameters for the execution of the computer program identified in paragraph (a)(1)(iii) of this section.

(v) Provide the result, the cumulative probability distribution function of EPFD, of the execution of the computer program described in paragraph (a)(1)(iii) of this section by using only the input parameters contained in paragraphs (a)(1)(i) and (a)(1)(iv) of this section.

(2) *Single-entry validation equivalent power flux-density, in the Earth-to-space direction, EPFD_{up} limits.* (i) Provide a set of NGSO FSS earth station maximum equivalent isotropically radiated power (e.i.r.p.) mask as a function of the off-axis angle generated by a NGSO FSS earth station. The maximum e.i.r.p. mask shall be generated in accordance with the specification stipulated in the ITU-R Recommendation BO.1503. In particular, the results of calculations encompass what would be radiated regardless of the earth station transmitter power resource allocation and traffic/beam switching strategy are used at different periods of a NGSO FSS system life. The e.i.r.p. masks shall also be in an electronic form that can be accessed by the computer program contained in paragraph (a)(2)(iii) of this section.

(ii) Identify and describe in detail the assumptions and conditions used in generating the maximum earth station e.i.r.p. mask.

(iii) If a computer program that has been approved by the ITU for determining compliance with the single-entry EPFD_{up} validation limits is not

yet available, the applicant shall provide a computer program for the single-entry EPFD_{up} validation computation, including both the source code and the executable file. This computer program shall be developed in accordance with the specification stipulated in Recommendation ITU-R S.1503 (2000). If the applicant uses the ITU approved software, the applicant shall indicate the program name and the version used.

(iv) Identify and describe in detail the necessary input parameters for the execution of the computer program identified in paragraph (a)(2)(iii) of this section.

(v) Provide the result of the execution of the computer program described in paragraph (a)(2)(iii) of this section by using only the input parameters contained in paragraphs (a)(2)(i) and (a)(2)(iv) of this section.

(b) Ninety days prior to the initiation of service to the public, the NGSO FSS system licensee shall submit a comprehensive technical showing for the non-geostationary satellite orbit fixed-satellite service (NGSO FSS) system in the bands 10.7 GHz to 14.5 GHz. The technical information shall demonstrate that the NGSO FSS system is expected not to operate in excess of the additional operational EPFD_{down} limits and the operational EPFD_{down} limits as specified in § 25.208 (i), (j) and notes 2 and 3 to the table in paragraph (l). If the technical demonstration exceeds the additional operational EPFD_{down} limits or the operational EPFD_{down} limits at any test points with the U.S. for domestic service and at any test points out side of the U.S. for international service, the NGSO FSS system licensee shall not initiate service to the public until the deficiency has been rectified by reducing satellite transmission power or other adjustments. This must be substantiated by subsequent technical showings. The technical showings consist of the following:

(1) *Single-entry additional operational equivalent power flux-density, in the space-to-Earth direction, (additional operational EPFD_{down}) limits.* (i) Provide a set of anticipated operational power flux-density (pfd) masks, on the surface of the Earth, for each space station in

the NGSO FSS system. The anticipated operational power flux-density masks could be generated by using the method specified in ITU-R Recommendation BO.1503. In particular, the anticipated operational pfd mask shall take into account the expected maximum traffic loading distributions and geographic specific scheduling of the actual measured space station antenna patterns (see § 25.210(k)). The anticipated operational power flux-density masks shall also be in an electronic form that can be accessed by the computer program contained in paragraph (b)(1)(iii) of this section.

(ii) Identify and describe in detail the assumptions and conditions used in generating the anticipated operational power flux-density masks.

(iii) Provide a computer program for the single-entry additional operational EPFD_{down} verification computation, including both the source code and the executable file. This computer program could be developed by using the method specified in ITU-R Recommendation BO.1503.

(iv) Identify and describe in detail the necessary input parameters for the execution of the additional operational EPFD_{down} verification computer program identified in paragraph (b)(1)(iii) of this section.

(v) Provide the result, the cumulative probability distribution function of EPFD, of the execution of the verification computer program described in paragraph (b)(1)(iii) of this section by using only the input parameters contained in paragraphs (b)(1)(i) and (b)(1)(iv) of this section for each of the submitted test points provided by the Commission. These test points are based on information from U.S.-licensed geostationary satellite orbit fixed-satellite service and broadcast satellite service operators in the bands 10.7 GHz to 14.5 GHz. Each U.S.-licensed geostationary satellite orbit fixed satellite service and broadcast satellite service operator in the bands 10.7 GHz to 14.5 GHz may submit up to 10 test points for this section containing the latitude, longitude, altitude, azimuth, elevation angle, antenna size, efficiency to be used by non-geostationary

satellite orbit fixed-satellite service licensees in the bands 10.7 GHz to 14.5 GHz during the upcoming year.

(2) Operational equivalent power flux-density, space-to-Earth direction, (operational EPFD_{down}) limits. Using the information contained in (b)(1) of this section plus the measured space station antenna patterns, provide the result of the execution of the computer simulation for the anticipated in-line operational EPFD_{down} levels for each of the submitted test points provided by the Commission. Submitted test points are based on inputs from U.S.-licensed geostationary satellite orbit fixed-satellite service and broadcast satellite service operators in the bands 10.7 GHz to 14.5 GHz. Each U.S.-licensed geostationary satellite orbit fixed-satellite service and broadcast satellite service operator in the bands 10.7 GHz to 14.5 GHz may submit up to 10 test points for this section containing the latitude, longitude, altitude, azimuth, elevation angle, antenna size, efficiency to be used by non-geostationary satellite orbit fixed-satellite service licensees in the bands 10.7 GHz to 14.5 GHz during the upcoming year.

(c) The NGSO FSS system licensee shall, on June 30 of each year, file a report with the International Bureau and the Commission's Columbia Operations Center in Columbia, Maryland, certifying that the system continues to operate within the bounds of the masks and other input parameters specified under 25.146(a) and 25.146(b) as well as certifying the status of the additional operational EPFD_{down} levels into the 3 m and 10 m geostationary satellite orbit fixed-satellite service receiving Earth station antennas, the operational EPFD_{down} levels into the 3 m, 4.5 m, 6.2 m and 10 m geostationary satellite orbit fixed-satellite service receiving Earth station antennas and the operational EPFD_{down} levels into the 180 cm geostationary satellite orbit broadcast satellite service receiving Earth station antennas in Hawaii and 240 cm geostationary satellite orbit broadcast satellite service receiving Earth station antennas in Alaska.

(d) The Commission may request at any time additional information from the NGSO FSS system applicant or li-

censee concerning the EPFD levels and the related technical showings.

(e) A NGSO FSS system licensee operating a system in compliance with the limits specified in § 25.208 (g), (i), (j), (k), (l) and (m) shall be considered as having fulfilled its obligations under ITU Radio Regulations provision S22.2 with respect to any GSO network. However, such NGSO FSS system shall not claim protection from GSO FSS and BSS networks operating in accordance with this part 25 or part 100 of this chapter, respectively, and the ITU Radio Regulations.

(f) Coordination will be required between NGSO FSS systems and GSO FSS earth stations in the frequency band 10.7–12.75 GHz when all of the following threshold conditions are met:

(1) Bandwidth overlap; and

(2) The satellite network using the GSO has specific receive earth stations which meet all of the following conditions: earth station antenna maximum isotropic gain greater than or equal to 64 dBi; G/T of 44 dB/K or higher; and emission bandwidth of 250 MHz; and the EPFD_{down} radiated by the satellite system using the NGSO into the GSO specific receive earth station, either within the U.S. for domestic service or any points outside the U.S. for international service, as calculated using the ITU software for examining compliance with EPFD limits set forth in Article 22 of the ITU Radio Regulations exceeds $-174.5 \text{ dB(W/(m}^2/40\text{kHz))}$ for any percentage of time for NGSO systems with all satellites only operating at or below 2500 km altitude, or $-202 \text{ dB(W/(m}^2/40\text{kHz))}$ for any percentage of time for NGSO systems with any satellites operating above 2500 km altitude.

(3) If there is no ITU software for examining compliance with EPFD limits set forth in Article 22 of the ITU Radio Regulations, then the EPFD_{down} coordination trigger is suspended and the requirement for coordination will be based on bandwidth overlap and the satellite network using the GSO has specific receive earth stations which meet all of the following conditions: earth station antenna maximum isotropic gain greater than or equal to 64 dBi; G/T of 44 dB/K or higher; and emission bandwidth of 250 MHz.

(g) *Operational power flux density, space-to-Earth direction, limits.* Ninety days prior to the initiation of service to the public, the NGSO FSS system licensee shall submit a technical showing for the NGSO FSS system in the band 12.2–12.7 GHz. The technical information shall demonstrate that the NGSO FSS system is capable of meeting the limits as specified in § 25.208(o). Licensees may not provide service to the public if they fail to demonstrate compliance with the PFD limits.

(h) *System License.* Applicants authorized to construct and launch a system of technically identical non-geostationary satellite orbit fixed satellite service satellites will be awarded a single “blanket” license covering a specified number of space stations to operate in a specified number of orbital planes.

(i) In addition to providing the information specified in § 25.114, each NGSO FSS applicant shall provide the following:

(1) A demonstration that the proposed system is capable of providing fixed-satellite services on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands, U.S.; and

(2) A demonstration that the proposed system be capable of providing fixed-satellite services to all locations as far north as 70 deg. latitude and as far south as 55 deg. latitude for at least 75 percent of every 24-hour period; and

(3) Sufficient information on the NGSO FSS system characteristics to properly model the system in computer sharing simulations, including, at a minimum, NGSO hand-over and satellite switching strategies, NGSO satellite beam patterns, NGSO satellite antenna patterns and NGSO earth station antenna patterns. In particular, each NGSO FSS applicant must explain the switching protocols it uses to avoid transmitting while passing through the geostationary satellite orbit arc, or provide an explanation as to how the power-flux density limits in § 25.208 are met without using geostationary satellite orbit arc avoidance. In addition, each NGSO FSS applicant must provide the orbital parameters contained in Section A.3 of Annex 1 to Resolution 46. Further, each NGSO FSS applicant

must provide a sufficient technical showing to demonstrate that the proposed non-geostationary satellite orbit system meets the power-flux density limits contained in § 25.208, as applicable, and

(4) A description of the design and operational strategies that it will use, if any, to mitigate orbital debris. Each applicant must submit a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the spacecraft.

(j) [Reserved]

(k) *Implementation Milestone Schedule.* Each NGSO FSS licensee in the 10.7–12.7 GHz, 12.75–13.25 GHz and 13.75–14.5 GHz frequency bands will be required to enter into a non-contingent satellite manufacturing contract for the system within one year of authorization, to complete critical design review within two years of authorization, to begin physical construction of all satellites in the system within two and a half years of authorization, to complete construction and launch of the first two satellites within three and a half years of grant, and to launch and operate its entire authorized system within six years of authorization. Each NGSO FSS licensee in the 10.7–12.7 GHz, 12.75–13.25 GHz and 13.75–14.5 GHz frequency bands must submit certifications of milestone compliance within 10 days following a milestone specified in its authorization.

(l) *Reporting Requirements.* All NGSO FSS licensees in the 10.7–12.7 GHz, 12.75–13.25 GHz and 13.75–14.5 GHz frequency bands shall, on June 30th of the first year following launch of the first two space stations in their system, and annually thereafter, file a report with the International Bureau and the Commission's Laurel, Maryland field office containing the following information:

(1) Status of space station construction and anticipated launch date, including any major problems or delay encountered;

(2) Identification of any space station(s) not available for service or otherwise not performing to specifications, the cause(s) of these difficulties, and the date any space station was taken out of service or the malfunction identified.

(m) Replacement of Space Stations within the System License Term. Licensees of NGSO FSS systems in the 10.7–12.7 GHz, 12.75–13.25 GHz and 13.75–14.5 GHz frequency bands authorized through a blanket license pursuant to paragraph (g) of this section need not file separate applications to launch and operate technically identical replacement satellites within the term of the system authorization. However, the licensee shall certify to the Commission, at least thirty days prior to launch of such replacement(s) that:

(1) The licensee intends to launch a space station into the previously-authorized orbit that is technically identical to those authorized in its system authorization and

(2) Launch of this space station will not cause the licensee to exceed the total number of operating space stations authorized by the Commission.

(n) In-Orbit Spares. Licensees need not file separate applications to operate technically identical in-orbit spares authorized as part of the blanket license pursuant to paragraph (g) of this section. However, the licensee shall certify to the Commission, within 10 days of bringing the in-orbit spare into operation, that operation of this space station did not cause the licensee to exceed the total number of operating space stations authorized by the Commission.

[66 FR 10619, Feb. 16, 2001, as amended at 67 FR 53510, Aug. 16, 2002; 68 FR 16447, Apr. 4, 2003; 68 FR 43946, July 25, 2003; 68 FR 51505, Aug. 27, 2003; 69 FR 31302, June 3, 2004]

EFFECTIVE DATE NOTE: At 68 FR 43946, July 25, 2003, § 25.146 was amended by redesignating paragraphs (g) through (m) as paragraphs (h) through (n) and by adding a new paragraph (g). This paragraph contains information collection and recordkeeping requirements and will not become effective until approval has been given by the Office of Management and Budget.

§ 25.147 Licensing provision for NGSO MSS feeder downlinks in the band 6700–6875 MHz.

If an NGSO MSS satellite transmitting in the band 6700–6875 MHz causes harmful interference to previously licensed co-frequency Public Safety facilities, then that satellite licensee is

obligated to remedy the interference complaint.

[67 FR 17299, Apr. 10, 2002]

§ 25.148 Licensing provisions for the Direct Broadcast Satellite Service.

(a) *License terms.* License terms for DBS facilities are specified in § 25.121(a).

(b) *Due diligence.* (1) All persons granted DBS authorizations shall proceed with due diligence in constructing DBS systems. Permittees shall be required to complete contracting for construction of the satellite station(s) within one year of the grant of the authorization. The satellite stations shall also be required to be in operation within six years of the authorization grant.

(2) In addition to the requirements stated in paragraph (b)(1) of this section, all persons who receive new or additional DBS authorizations after January 19, 1996 shall complete construction of the first satellite in their respective DBS systems within four years of grant of the authorization. All satellite stations in such a DBS system shall be in operation within six years of the grant of the authorization.

(3) DBS licensees shall be required to proceed consistent with all applicable due diligence obligations, unless otherwise determined by the Commission upon proper showing in any particular case. Transfer of control of the authorization shall not be considered to justify extension of these deadlines.

(c) *Geographic service requirements.* Those entities acquiring DBS authorizations after January 19, 1996, or who after January 19, 1996 modify a previous DBS authorization to launch a replacement satellite, must provide DBS service to Alaska and Hawaii where such service is technically feasible from the authorized orbital location. This requirement does not apply to DBS satellites authorized to operate at the 61.5° W.L. orbital location. DBS applicants seeking to operate from locations other than 61.5° W.L. who do not provide service to Alaska and Hawaii, must provide technical analyses to the Commission demonstrating that such service is not feasible as a technical matter, or that while technically feasible such services would require so